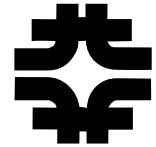


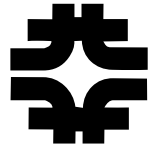
RESOURCE PLANNING FOR COMPUTING OPERATIONS

Vicky White

Fermilab

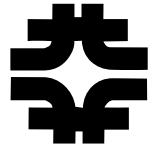
March 29, 2005

Five Computing Activity Areas



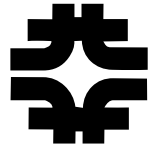
1. Provide dedicated help, leadership and active participation in running and approved experiments and other lab scientific programs (including support and expert help to the Accelerator Division).
2. Provide services, tools, and components, and operate computing facilities that serve the lab and the scientific program broadly.
3. Work on projects funded competitively – e.g. SciDAC & GRID projects and Network/Storage research
4. Participate in planning and R&D for future experiments/lab activities.
5. Run a computing organization and computer center.

Resource Planning for Tevatron Operations



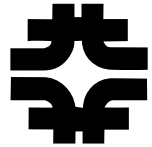
- All but one of these five areas of work have elements within the scope of this review
  - We strive to maintain the correct balance between them
  - We strive to :-
    - leverage between scientific programs
    - use common solutions and services
    - operate efficiently by operating “at scale”
    - use external funding to help align Run II and LHC computing (and SDSS and Lattice QCD and others)
      - Grid projects, Network Research, Storage Systems projects
    - Allocate enough M&S to build on Fermilab core competencies and provide solid core of computing – but not do it all (ref. Amber’s talk on Run II Computing)

Bottoms up resource planning



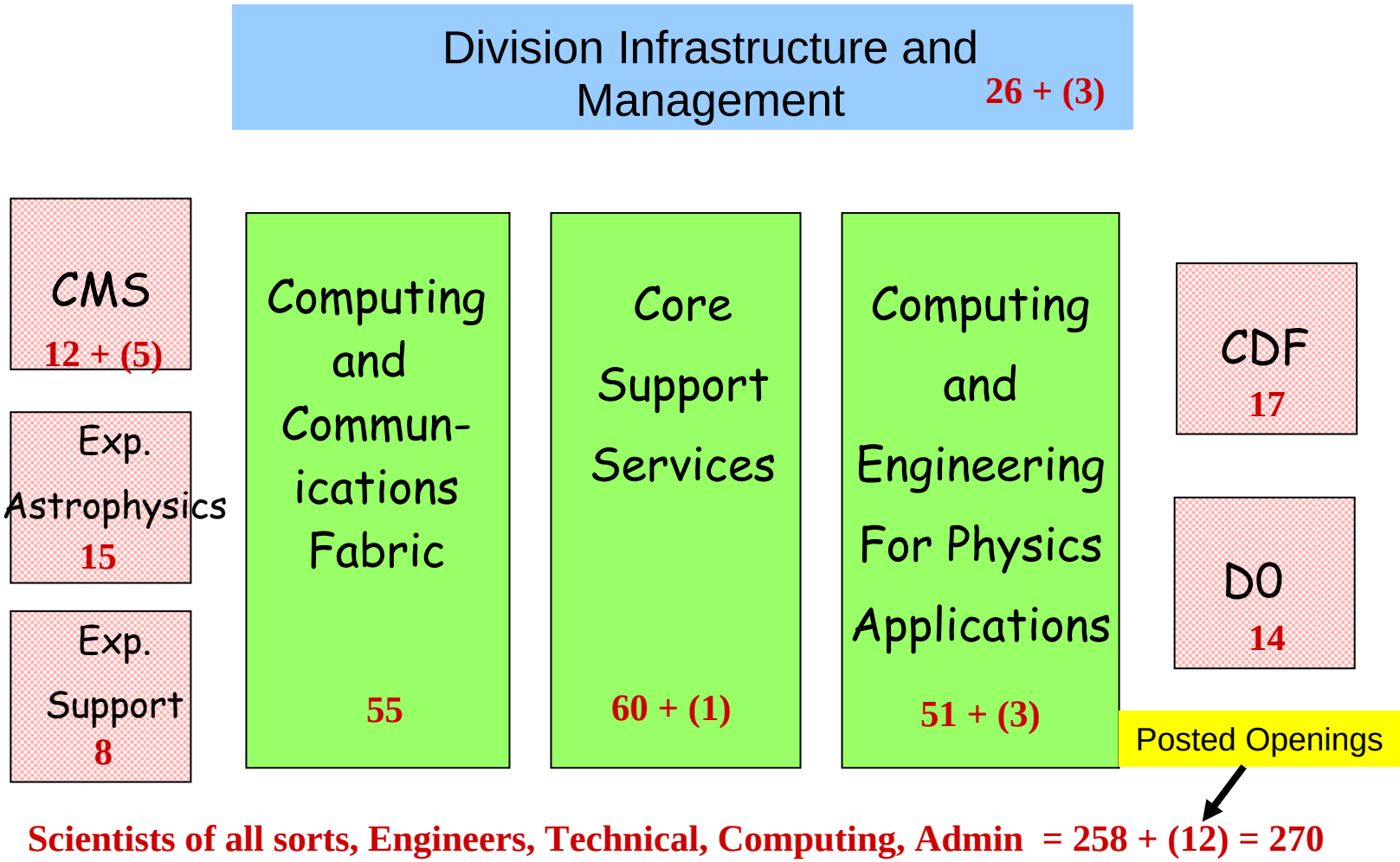
- We do detailed yearly budget planning – down to as much as 6 level deep WBS numbers, with resources sometimes as small as 0.1 FTE and a few hundred dollars
- We are always oversubscribed in M&S requests by a large amount (~$3M) in particular in
  - Networks
  - Storage systems evolution costs
  - Desired Computing and Disk resources for Run II and MINOS
  - Facility infrastructure costs
- However, without adequate staff we cannot buy and run computers and disks and databases and storage systems and
  - Continue to run reliable services (many 24X7)
  - Meet increasing cyber security and IT management demands
- Our bottoms-up requests for additional staff run at around 15 FTEs (not including desires for Future initiatives or for CMS)
  - We need to reduce staff in fact, not satisfy these pent up demands

Staff vs. M&S planning strategy



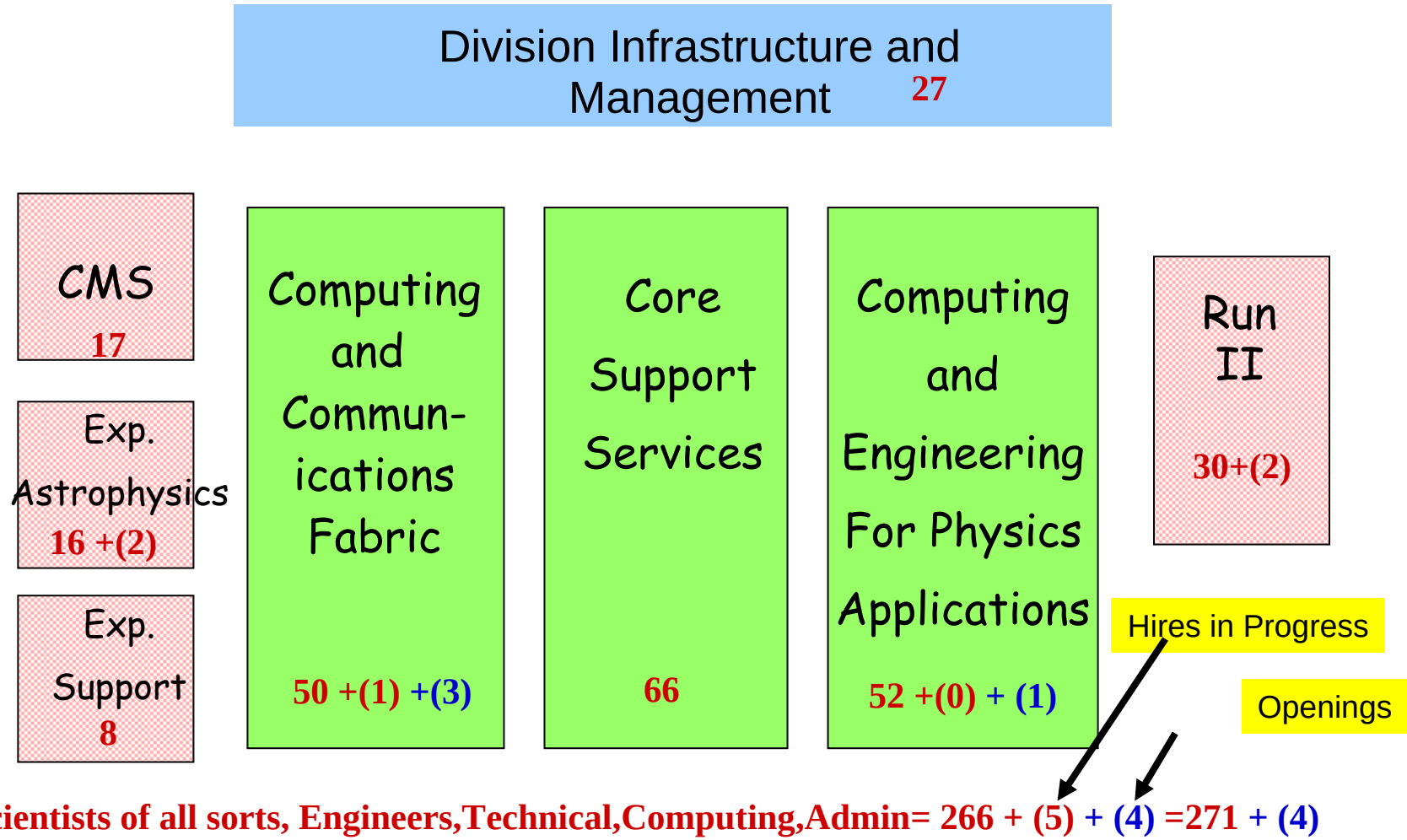
- Maintain M&S budget approx flat
  - Else there will not be sufficient core strength to build distributed computing infrastructure on
- Reduce staff by about 4 % per year overall
  - Evolve the Computing Organizational structure
  - Become more efficient
  - Retrain staff
  - Continue to bring in staff with modern skills and replace staff with lesser skills
- This strategy involves risk but unless we take this risk there will be no effort for any future program

Computing Division Organization March 2004

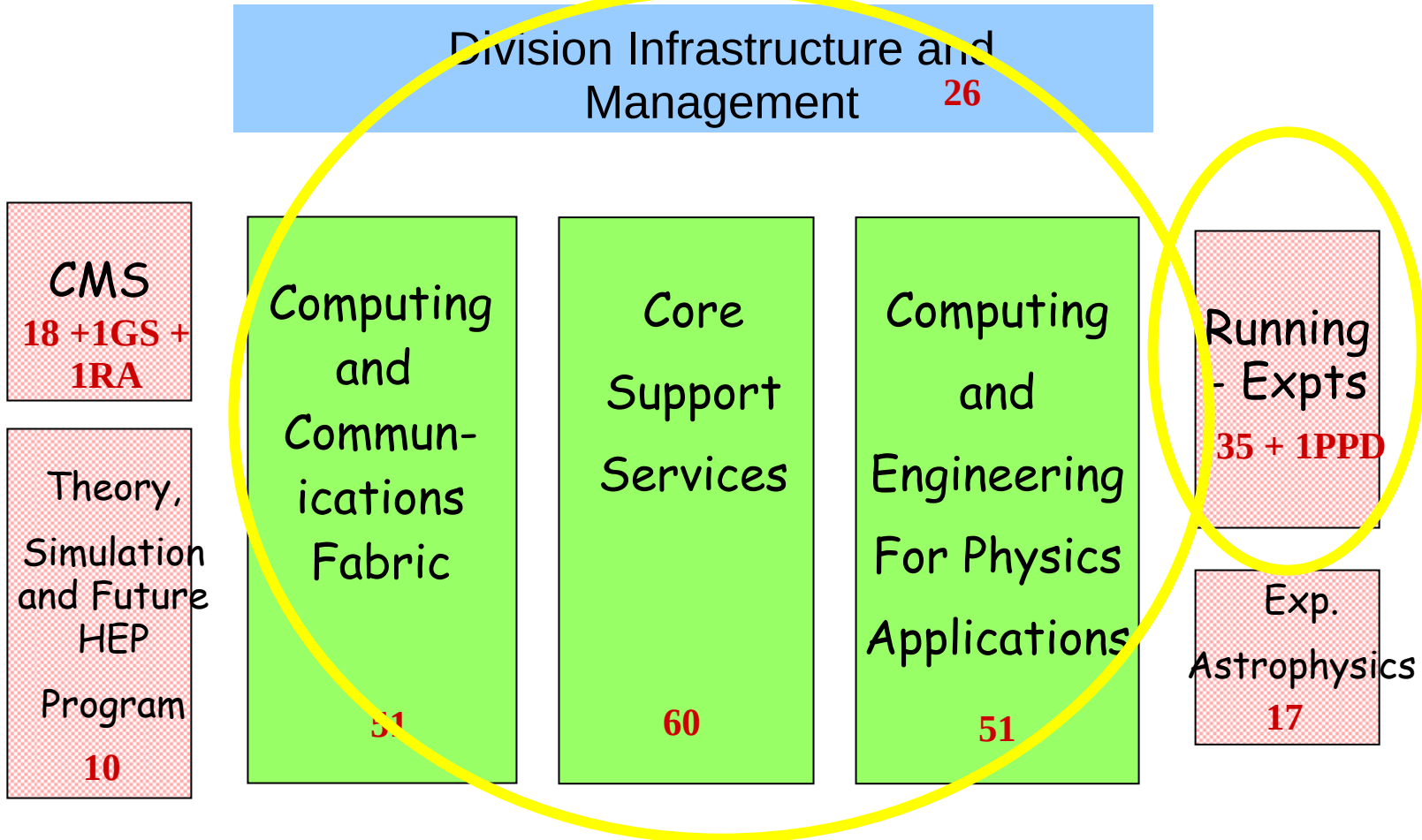


Scientists of all sorts, Engineers, Technical, Computing, Admin = 258 + (12) = 270

Computing Division Organization end March 2005

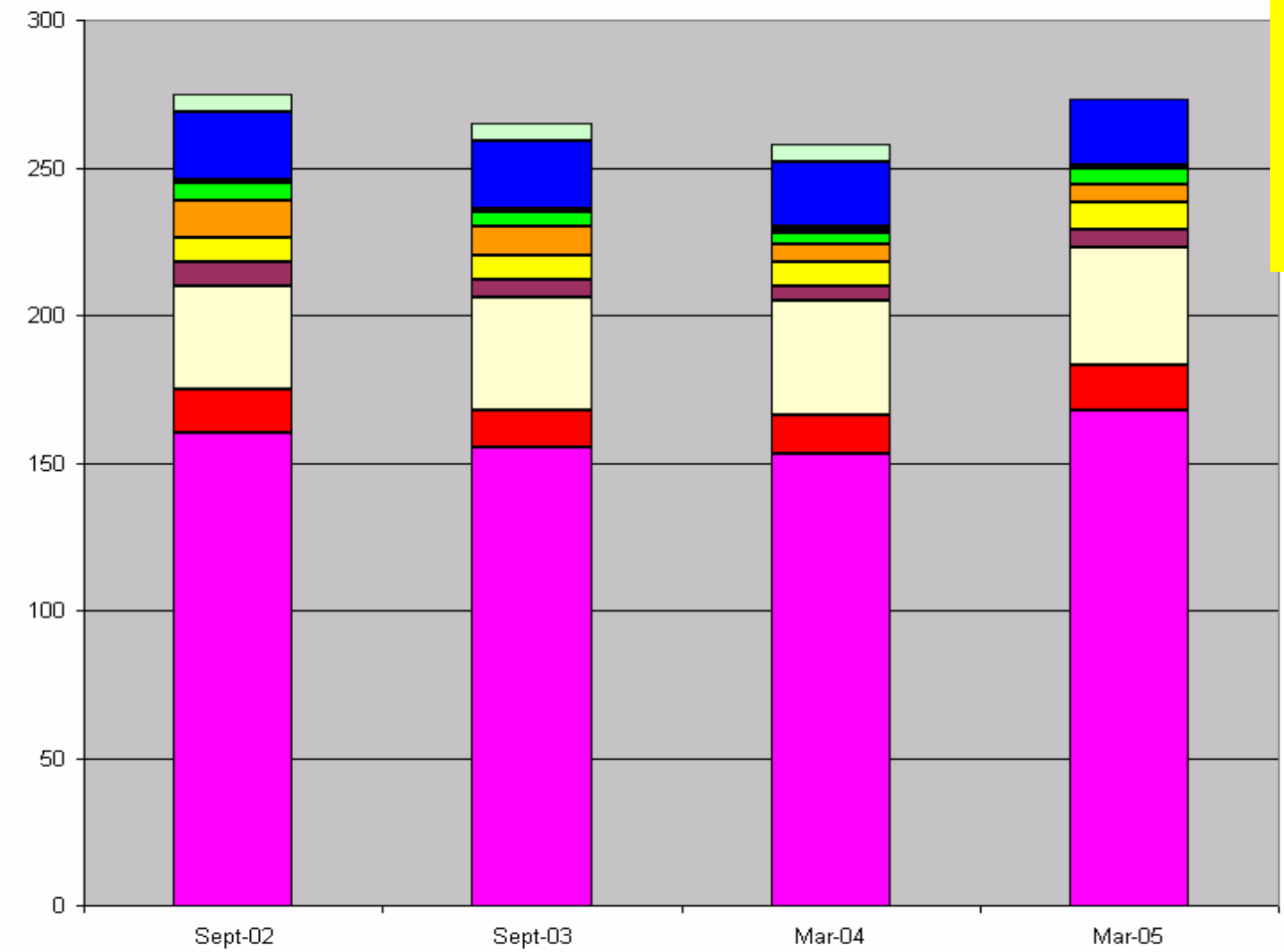


Future CD Organization post-BTeV – 2005 (still under discussion)



Scientists of all sorts, Engineers,Technical,Computing,Admin = 271

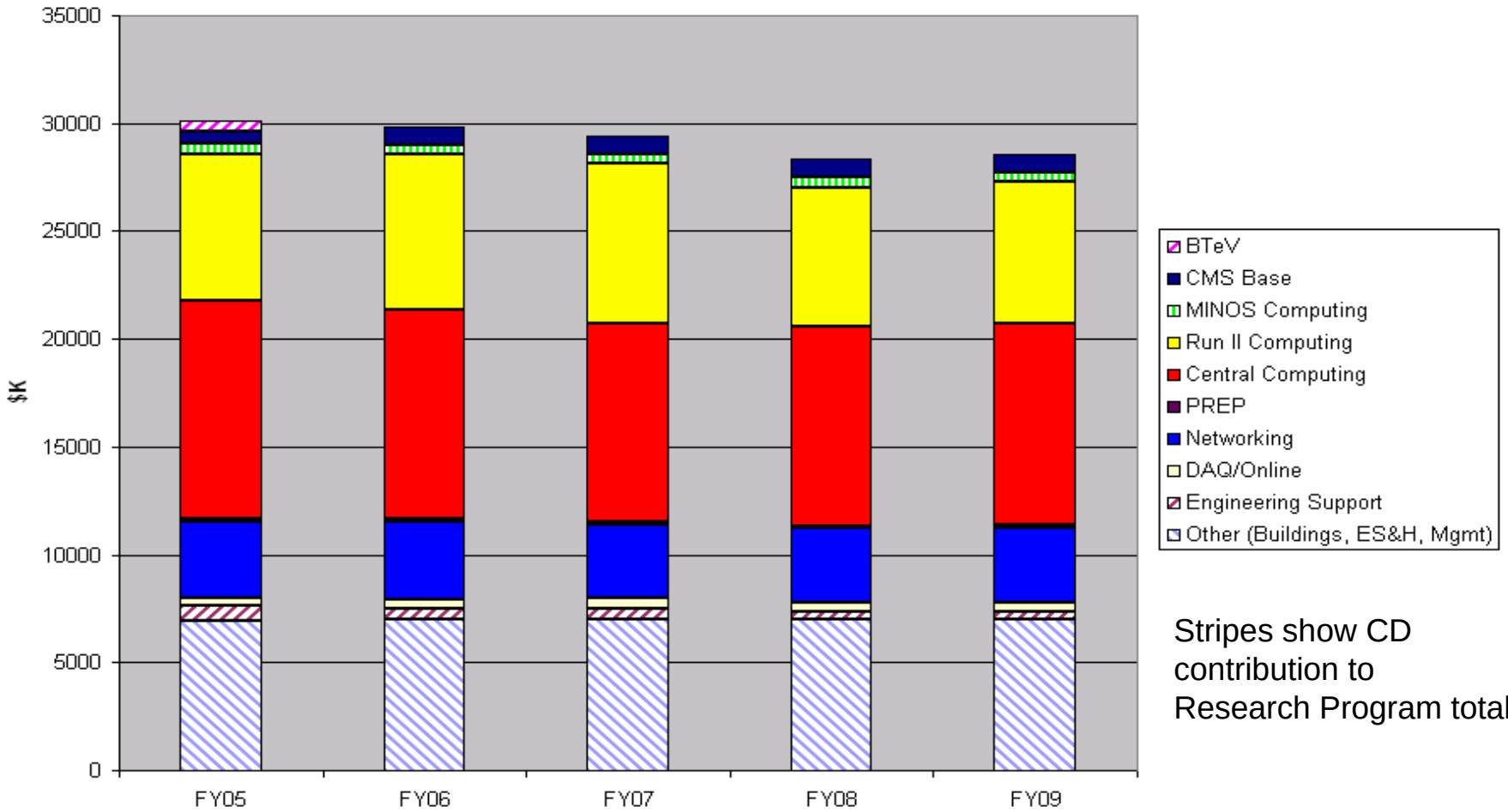
Job Categories 2002-present



Programs added
CMS(+12)
Accelerator Support (~12)
Network Research (2)

Programs rolled off
?

Computing M&S + SWF



Stripes show CD contribution to Research Program total

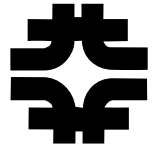
FTE Staffing

- Staffing for the major projects (including the Experiments that are in the scope of this review) comes from a combination of
  - Directly assigned staff, e.g. Run II Department, CMS dept
  - Shared services and developments e.g.
    - Grid Services (e.g. storage and data movement) ,databases,networks,engineering support
  - Use of more general services and staff e.g.
    - Helpdesk, email, repairs, desktops, etc.

Some Common Services

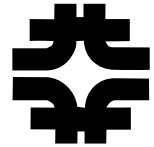
Common Service	Customer/Stakeholder	Comments
Storage and Data movement and caching	CDF, D0, CMS, MINOS, MiniBoone, MIPP, Theory, SDSS, KTeV, all	Enstore – 2.6 Petabytes data ! dCache, SRM
Databases	CDF, D0, MINOS, CMS, Accelerator, ourselves	Oracle 24x7 mySQL,Postgres
Networks, Mail, Print Servers, Helpdesk, Windows, Linux, etc.	Everyone !	First class, many 24X7 services, central web servers, OS support, + lead Cyber Security
SAM-GRID	CDF, D0, MINOS	Still aligning with LHC – Run II needs to interoperate on LHC grid and US Open Science Grid
Simulation, MC and Analysis Tools	CDF, D0, CMS, MINOS, Fixed Target, Accel. Div.	Growing needs
Farms	All experiments + Accelerator	Goal – all Farms are on FermiGRID
Engineering Support and R&D	CDF, D0, (BTeV), JDEM, Accelerator Projects	Diminishing Q outside our door

Accomplishments



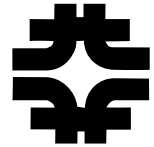
- Reliable recording, processing and analysis of data plus increasing use of offsite resources in both CDF and D0
- Heavy use of the new fiber link to Starlight for D0 reprocessing (as well as CMS overflow and service challenges)
- Provided MINOS with Computing
  - largely through shared facilities and use of Run II developed systems such as dcache, SAM, Enstore
- Commissioned new Grid Computing Center
  - Moved to operating 1 central (Generator protected) and 2 satellite centers - Feynman, Grid and Lattice Computing Centers
- Plans in place for further facility upgrades
- Many new hires with needed skills

Evolution of staff for Tevatron Operations (and more)



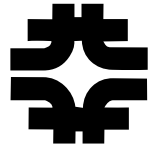
- In past year Computing Division staff evolved in the following way
  - Lost 18 people
  - Hired 32 people – to ramp up for CMS and to hire people with specific Grid development, Storage, Engineering (for BTeV), Database, Computer Security and Simulation skills
  - Combined CDF and D0 operations department
    - Merged system administration, data handling and production farm efforts
  - Took on CDF online system administration – MOU with PPD
    - Merged into one Run II system administration group (for all but Farms systems)
  - Went to lights out operations – laid off 6 computer operators
  - Outsourced more of the physical network layer work
  - Moved ~12 people within the division into new assignments

Future Evolution of staff for Tevatron Operations FY06-FY09



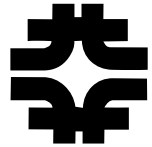
- Will add D0 online systems and databases administration in next few months (1 or 2 FTE transfer from PPD)
- Database Application Development and Support for Run II will diminish in FY06 and even further in FY07-FY09. Continued support for operating databases
- Expect consolidation of operations of all running experiments will yield a 1 person savings per year through FY08. Some resources may move from “Running Experiments” Dept – to common services departments.
- Expect that evolving Run II experiments to the Grid will continue to be a lot of work – through FY08 – until after LHC turns on and Grid infrastructure stabilizes.
- MINOS support is fairly minimal – unlikely to decrease

Risks, Challenges, Mitigations (1)



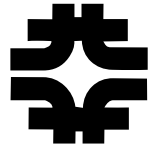
- Reliance on Offsite resources/Grid Computing
  - Going well – but overall lack of funding from DOE and NSF for Grid Infrastructure and Network Infrastructure is a big risk
    - Need support for Middleware (Globus, Condor,VDT, iGOC, SRM), Grid Project continuations (PPDG, GriPhyN, iVDGL) and Open Science Grid development & operations
    - Must get ESnet upgrades (and LHCnet) !!
  - Mitigation: Funding agencies please work together on support building “cyber infrastructure” for global science - and build on the huge successes in Grid Computing so far

Risks, Challenges, Mitigations (2)



- Computing Facility Infrastructure
  - planned, but may be a bit late
- Distribution of data across 2 buildings to mitigate risk of catastrophe and also provide more reliable access to data
  - Ongoing –achieve partially in FY06
- Government (President/OMB/DOE) directives on managing Information Technology, Personal Identification, Foreign Visitors, Cyber Security, Asset management, and more…
  - Only mitigations are to work via SLCCC, Lab Directors, Ray Orbach, and Congress and to learn how to “get to green” in a way that does not compromise the science

Risks, Challenges, Mitigations (3)



- Collaborations possibly becoming too weak to run detectors and experiment parts of computing.
  - Need the MOUs
  - Need to build a solid operational model that will work with fewer people.
  - LHC Physics Center at Fermilab should help to encourage continued participation in Run II experiments during the transition to the LHC era